

## CLAIMS

What is claimed is:

1. A gas conversion system for removing NO<sub>x</sub> and SO<sub>x</sub> from gases comprising:
  - a duct through which the gases flow, the duct having a port for introducing a reaction agent into the duct to the gases; and
  - 5 first and second electron beam emitters each having a single exit window mounted to the duct over openings in the duct opposite from each other for directing opposed electron beams into the duct and causing components of the NO<sub>x</sub>, SO<sub>x</sub> and reaction agent to react to remove NO<sub>x</sub> and SO<sub>x</sub> from the gases.
- 10 2. The gas conversion system of Claim 1 in which the reaction agent is ammonia.
3. A treatment system for removing a compound comprising:
  - a duct through which gases flow, said compound being mixed with the gases, the duct having a port for introducing a reaction agent into the duct to the gases; and
  - 15 first and second electron beam emitters each having a single exit window mounted to the duct over openings in the duct opposite from each other for directing opposed electron beams into the duct and causing components of the compound and reaction agent to react to remove the compound from the gases.
4. An electron beam treatment system comprising:
  - 20 a duct through which a substance to be treated flows; and
  - first and second electron beam emitters each having a single exit window mounted to the duct over openings in the duct opposite from each other for directing opposed electron beams into the duct to treat the substance.

5. The system of Claim 4 in which the substance includes VOCs.
6. An electron beam treatment system comprising:
  - an electron beam emitter for generating an electron beam through an exit window; and
- 5 a reaction chamber mounted to the electron beam emitter for receiving the electron beam from the electron beam emitter, the reaction chamber having a nozzle for directing a substance towards the exit window for treatment and an outlet adjacent to the nozzle for receiving the treated substance.
7. A method of forming a gas conversion system for removing carbon dioxide from gases comprising:
  - providing a duct through which the gases are circulated, the duct having a port for introducing a reaction agent into the duct to the gases; and
  - positioning an electron beam emitter relative to the duct for directing an electron beam into the duct and causing components of the carbon dioxide and the reaction agent to react to remove carbon dioxide from the gases and release oxygen.
- 15 8. The method of Claim 7 in which the carbon dioxide is within air, the method further comprising providing an air circulator for circulating the air.
9. The method of Claim 8 further comprising employing water as the reaction agent.
- 20 10. The method of Claim 7 further comprising positioning a separator downstream from the electron beam emitter for separating solids from the gases which are

formed by reaction of the components of the carbon dioxide and the reaction agent.

11. A method of removing carbon dioxide from gases comprising:
  - introducing a reaction agent to the gases; and
  - 5                   treating the reaction agent and the gases with an electron beam, the electron beam causing components of the carbon dioxide and the reaction agent to react to remove carbon dioxide from the gases and release oxygen.
12. The method of Claim 11 in which the carbon dioxide is within air, the method further comprising circulating the air through the electron beam.
- 10   13. The method of Claim 12 further comprising circulating the air with an air circulator.
14. The method of Claim 13 further comprising circulating the air within an enclosed environment.
15. The method of Claim 13 further comprising the step of introducing water as the reaction agent.
16. The method of Claim 11 further comprising removing solids from the gases which are formed by reaction of the components of the carbon dioxide and the reaction agent.
17. A method of removing carbon dioxide from air in an air circulation system comprising:
  - 20                   circulating the air through a duct;
  - introducing a reaction agent to the air; and

treating the reaction agent and the air with an electron beam, the electron beam causing components of the carbon dioxide and the reaction agent to react to remove carbon dioxide from the air and release oxygen.

18. A method of removing NO<sub>X</sub> and SO<sub>X</sub> from gases comprising:
  - 5 flowing the gases through a duct;
  - introducing a reaction agent to the gases; and
  - treating the reaction agent and the gases with opposed electron beams from first and second electron beam emitters and causing components of the NO<sub>X</sub>, SO<sub>X</sub> and reaction agent to react to remove NO<sub>X</sub> and SO<sub>X</sub> from the gases,
  - 10 the first and second electron beam emitters each having a single exit window and are mounted to the duct over openings in the duct opposite from each other.
19. The method of Claim 18 further comprising introducing ammonia as the reaction agent.
20. A method of removing a compound comprising:
  - 15 flowing gases through a duct, said compound being mixed with the gases;
  - introducing a reaction agent to the gases; and
  - treating the reaction agent and the compound with opposed electron beams from first and second electron beam emitters and causing components of the compound and reaction agent to react to remove the compound from the gases, the first and second electron beam emitters each having a single exit window and are mounted to the duct over openings in the duct opposite each other.
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21. A method of treating a substance comprising:
  - flowing the substance through a duct; and
  - treating the substance with opposed electron beams from first and second electron beam emitters each having a single exit window mounted to the duct over openings in the duct opposite from each other.
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22. The method of Claim 21 in which the substance includes VOCs, the method further comprising treating the VOCs.
23. A method of treating a substance comprising:
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directing an electron beam from an electron beam emitter into a reaction chamber; and
  - directing the substance towards the electron beam for treatment with a nozzle and receiving the treated substance with an outlet adjacent to the nozzle.